XII. DISCOVERY OF FOSSIL MAMMALS IN THE BROWN'S PARK FORMATION OF MOFFATT COUNTY, COLORADO.

By O. A. Peterson.

The predominant color of the Brown's Park Formation of Major Powell,[1] is light gray to white. It rests directly, but unconformably, upon the Bridger or the Uinta, and all earlier formations in the region northeast and east of the Uinta and Blue Mountains of Utah and Colorado. The formation consists of finer and coarser sandstones and occasionally layers of finer or coarser gravel. The sandstones are often firm and regularly bedded, but sometimes soft and more easily eroded. The lithological structure is upon the whole quite similar to the Miocene series observed by the writer on the Eastern flanks of the Rocky Mountains and in Montana. These Brown's Park sediments cover a considerable area drained by Green River and the Vermilion Creek in its western portion, while outliers of the sediments extend eastward to the vicinity of the Two Bar Ranch on the Little Snake River, to Cedar Mountain, Lay P. O. on Lay Creek, and to Juniper Springs on the Bear River. The greatest vertical development of this formation is in Brown's Park proper, and may exceed three hundred feet in places, while to the east the formation is thinner.

In 1894, after crossing Green River at Jarvis Ferry, Brown's Park, the writer first encountered the Brown's Park Formation. A hasty examination was made for the purpose of finding fossils, but with little or no success. Only the shaft of one limb-bone was found, and this furnished no satisfactory evidence as to the age of the sediments. To the best of my knowledge previous to this time no fossil vertebrates had been found in the Brown's Park sediments. In 1922 a second opportunity presented itself for a reconnaissance of the Brown's Park region. The Carnegie Museum party, consisting of Messrs. Douglass,

[1]F. V. Hayden calls attention to the fact that Brown's Park was originally named Brown's Hole by trappers forty or more years previous to his report. (Preliminary Report of the Geological Survey of Wyoming and Portions of Contiguous Territories, 1874, pp. 64-65). Hayden also describes the color of this formation, regards it as Pliocene, and of six hundred to eight hundred feet in thickness, p. 65.

Coggeshall, Kay, and myself, travelled through nearly the entire length of the Brown's Park formation. Frequent stops were made in looking for fossil remains, but none were found. However, during the past season, 1923, Messrs. Douglass and Kay were more successful. Mammalian remains representing five individuals were discovered, four of them belonging to carnivora and one to the *Camelidæ*. With the exception of one specimen, these, the first discovered mammalian remains, are rather unsatisfactory because of their fragmentary condition. However, enough has been obtained to approximately give the geological age of the Brown's Park formation. Apparently these sediments should be classified as ranging from the uppermost Oligocene to the middle Miocene. Although the genus *Phlaocyon* of Dr. Matthew is recognized, I somewhat hesitate in saying that the Brown's Park series of sediments are, in part, equivalent to the uppermost Oligocene of eastern Colorado.[2] In the material found there are certain characters, such as the long carnassial tooth of the carnivore and the extremely hypsodont molar of the cameloid, which point more strongly to later horizons, the Gering, Monroe Creek, and possibly the Lower Harrison beds of eastern Colorado, Wyoming, and western Nebraska. It is unfortunate that the tooth of the cameloid mentioned was not found in place. The field-notes, however, indicate that it could not have come from any but the Brown's Park formation. I have given below the horizon, so far as I am able, from the fragmentary evidence at hand. It should be stated that this determination is provisional, subject to verification upon the discovery of more complete paleontological evidence.

CARNIVORA.

Phlaocyon willistoni[3] sp. nov.

Type: Anterior portion of skull, C. M. Cat. Vert. Fossils, No. 11,332; and a lower jaw, C. M. Cat. Vert. Fossils, No. 11,333.

Locality: One mile south and west of Sunbeam, Moffatt County, Colorado.

Horizon: Lower Miocene, Brown's Park formation.

Specific Characters. Muzzle relatively broad. Alveolar border of maxillary and premaxillary long, teeth large and M^1 and M^2 more nearly in line externally, when compared with *Phlaocyon leucosteus*

[2]Bull. Amer. Mus. Nat. Hist., Vol. XII, 1899, p. 131.

[3]In honor of the late Professor S. W. Williston.

Matthew. The type of the present species is approximately one-fifth smaller than *Phlaocyon leucosteus* and about the size of *Bassariscus* of the southwestern United States.

The incisors of *P. willistoni* appear[4] to be more crowded than in *P. leucosteus* and the distance between I^3 and the canine are proportionally greater in the specimen in the Carnegie Museum. Incisors and canines are broken near the alveolar border, and premolars one and two are lost. P^3 has a simple crown with a small posterior heel, but no tubercle. The sectorial is only one millimeter shorter than

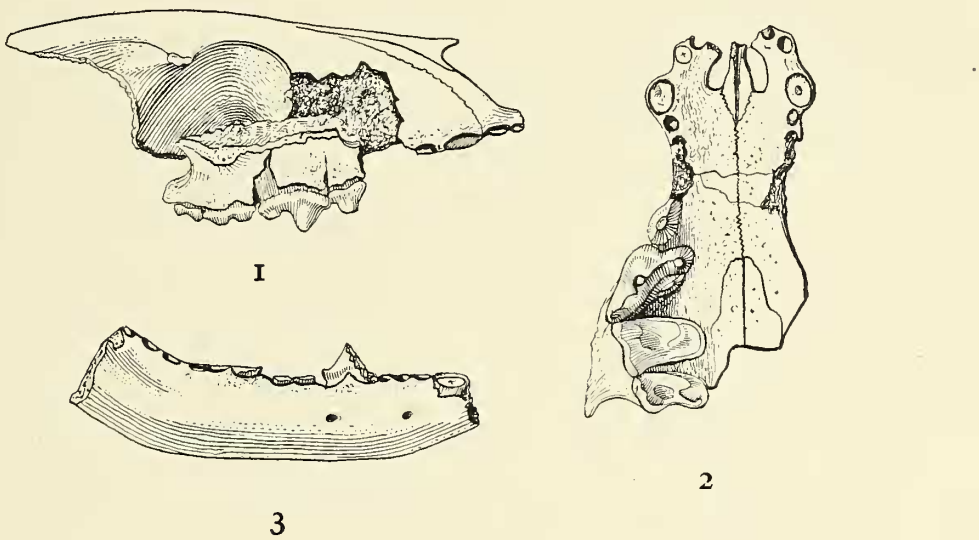

FIG. 1. *Phlaocyon willistoni*, Type, Nos. 11332, 11333.

1, side view; 2, palate views; No. 11332; 3, right jaw seen from side, No. 11333. All figures natural size.

that found in *P. leucosteus;* the tubercle of the crown is rather rounded; and there is a fairly well developed postero-internal cusp on the cingulum. From this cusp backward there is a prominent cingulum, which extends nearly to the apex of the sectorial tubercle. The apparent separation between this sectorial blade and the main cusp is due in great extent to wear, the specimen representing an old individual. The antero-external angle of M^1 is lost and the molars have received much wear, but it is possible to determine that they are of relatively greater size than those in *Phlaocyon leucosteus*,

[4]Measurements are taken in part from the description in the footnote of Dr. Matthew (Bull. Amer. Mus. Nat. Hist., Vol. XI, 1899, p. 54.) and from his illustrations, *ibid.*, Vol. XII, Pl. VI, and Fig. 10, p. 135.

and, as in that species, subquadrate. The specimen has received very little crushing, so that the different measurements obtained are quite reliable.

A lower jaw, minus the angle and with the crowns of the teeth broken off, was found in close vicinity to the skull. This second specimen has been given a different number (No. 11,333), because it is possible that it may not belong with the skull, and that it may prove to pertain to another species. The alveole for the canine is of extraordinary size, indicating a large canine which appears to agree with the large space between the last incisor and the canine of the upper series. P_1 is single-rooted and M_3 has its alveolus on the raised portion of the alveolar border. Its root was single, small, short, indicating a rudimentary condition. The jaw is shallow, heavy, and the under borders well rounded anteroposteriorly.

MEASUREMENTS.

Skull:

Length of alveolar border I^3 to and including M^2	33 mm.
Width of muzzle across base of canines	15 mm.
Length of carnassial	9 mm.
Length of M^1	6 mm.
Width of M^1	8 mm.
Length of M^2	3.5 mm.
Width of M^2	6.5 mm.

Lower Jaw:

Length from canine to anterior margin of alveolus for M_3	33 mm.
Depth of jaw at sectorial tooth	8 mm.

A third specimen, C. M. Cat. Vert. Foss., No. 11,334, found in the same place as *Phlaocyon willistoni*, is a lower jaw, considerably smaller in size than No. 11,333, described above. This undoubtedly represents an additional species, but, since there is no way of comparing it with *P. willistoni*, which has just been described, it seems preferable to only call attention to the chief features of the specimen, which are as follows: the jaw in its general contour is quite similar to that of *Phlaocyon willistoni*; the canine is large and the crown has received considerable wear on the apex; the base of the crown has a heavy cingulum on the inner anterior and posterior faces. P_1 is single-rooted; the three following teeth are double-rooted. The carnassial is a long tooth, with a well developed trigon and a basined

heel, though the two internal tubercles on the heel are not as far advanced as in the type of *Nothocyon annectens* in the collection of the Carnegie Museum from the Nebraskan Miocene. M_2 has three

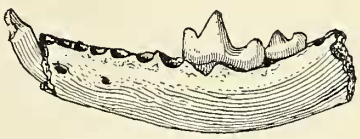

FIG. 2. *?Phlaocyon.* Left lower jaw. No. 11334. Natural size.

tubercles on the crown, one internal and two external, and does not appear to have advanced far from *Cynodictis* of the Oligocene. On the raised portion of the alveolar border in the specimen being described there is evidence of an alveolus for M_3. This tooth was in the same rudimentary stage of development as in *Phlaocyon willistoni*, judging from the character of the alveolus.

MEASUREMENTS.

Length of jaw from canine to alveolus of M_3	26 mm.
Length of carnassial tooth	8 mm.
Length of M_2	4 mm.
Depth of jaw at M_1 (carnassial)	5.5 mm.

A fourth individual, representing a carnivore, C. M. Cat. Vert. Foss., No. 11,335, consists of fragments of the anterior portion of both lower jaws, with the premolar teeth. This specimen was found in the same locality and horizon of the Brown's Park formation, near Sunbeam, Colorado. The fragments pertain to a larger animal, with the jaw quite heavy, but relatively deeper than those described above. In fact the fragments indicate an animal larger than *Phlaocyon leucosteus* of eastern Colorado and differ also from the latter by the presence of a posterior accessory cusp on P_3, but the premolars are, however, very similar in height and general characters. P_4 is represented only by a portion of the crown and the roots of the larger fragment, while the posterior part of the tooth is preserved on the opposite jaw. This tooth has the posterior accessory cusp and heavy cingulum on the posterior and external faces, as is represented in the illustration of *Phlaocyon leucosteus*, Bull. Amer. Mus. Nat. Hist. Vol. XII, 1899, p. 135.

MEASUREMENTS.

Length of jaw from canine to M_1	24 mm.
Depth of jaw at P_4	13 mm.

ARTIODACTYLA.

An isolated tooth (M_3 of right jaw), C. M. Cat. Vert. Foss., No. 11,336, was picked up by Gavin Douglass in the lower part of Sand Wash, west of Two Bar Ranch, Moffatt County, Colorado. This tooth is clearly that of a cameloid closely allied to *Stenomylus*.

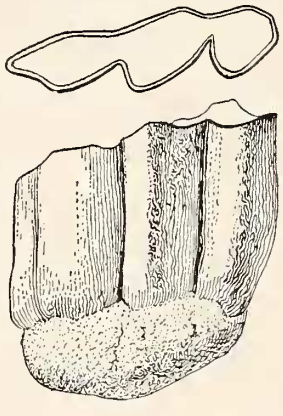

FIG. 3. Cameloid, closely allied to *Stenomylus*. M_3 of right side. No. 11336. Natural size.

The length of the tooth is approximately the same as in the average of *Stenomylus*, but the third lobe is relatively somewhat larger and the anterior lobes are more triangular in diameter. The tooth is, however, of the same hypsodont type as in *Stenomylus*.

MEASUREMENTS.

Antero-posterior diameter of M_3	2 mm.
Transverse diameter of M_3 anterior lobe	7 mm.
Height of crown of M_3	16 mm.